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CENTRAL INTELLIGENCE AGENCY

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INFORMATION REPORT

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COUNTRY USSR

SUBJECT Machine Shop #2 of the NKMZ

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SUPP. TO
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1. Machine Shop #2 of the NKMZ (Novo Kramatorsk Machine Factory) is one of the principal manufacturing shops of the plant. Its main purposes are the machining, assembling, testing, and completing of manufactured items. Machine Shop #2 works in conjunction with other production shops of the plant as a servicing shop.
2. The following items were manufactured by Machine Shop #2: bridge cranes (assembly and special) for various purposes. Their lifting capacity varied from five tons up to 350 tons; mining elevators with one or two drums. The diameters of the drums varied from three meters up to six meters; coke pushers; gas generators; coal disintegrators; machines for cutting station tunnels for the Moscow subway; tubing and tubing rings for subway tunnels; gear reducers (spur, bevel and worm, single-step and multi-step, standard and special types including reducers for rolling mills of the largest sizes); ball mills for making coal powder; single production conveyor belt (a very large "Bandwagen"); excavators; hydraulic presses; winches, etc; the shop also did the machining of separate machine parts.
3. The volume of output of the shop in 1936-1937 was 1000-1200 tons per month or 12000-15000 tons per year. [redacted] the operation of NKMZ was 25X1X recognized to be a profitable one for the first time in 1940, and for that year [redacted] production to have been 1000-1600 tons per month and 12000-19000 tons per year. Regarding the production for 1940, [redacted] although the 25X1X quota per month was 1600 tons, the production never actually reached that figure.
4. The total number of workers and employees in the shop was approximately 1600.

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5. The dimensions of the shop building are approximately as follows:

- (a) length, without accompanying building and annex, 185 m; width, 100 m;
- (b) total length, i e length including accompanying building, 193 m;
- (c) area of shop building, 18500 sq m;
- (d) area of accompanying building, 800 sq m;
- (e) total area of the shop, without the small side addition, 19300 sq m.

6. The shop had six working bays, the names of which are as follows:

- Bay #1 - small machine tools
- Bay #2 - medium machine tools
- Bay #3 - boring machines
- Bay #4 - large machine tools
- Bay #5 - gear-cutting machines
- Bay #6 - assembly bay

7. The elevation of bridge crane tracks above the floor level was about eight meters for the machining bays, about 12-15 meters for the first floor crane tracks in Bay #6, and about 18-20 meters for the second floor crane tracks in Bay #6.

8. The office of the shop was situated in the accompanying building. This was a three-story brick building, which adjoined the shop along the end opposite Bay #6. On the first floor of the accompanying building there was a room called the "red corner" (for recreation hours and meetings). The left wing of the "accompanying building" was occupied, [] by the "PVKhO" - Anti-Aircraft and Anti-gas Defense. There was also a lateral addition to the shop which was brick, and served as an auxiliary compartment of the shop. Some auxiliary wooden structures of a light type were in the bays of the shop building.

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9. The framework of the shop building was of reinforced concrete, [] The (inner) supporting columns, beams under crane tracks, and constructions supporting the roof were steel. A very large glass-covered area of the walls and roof-windows provided good daytime lighting from both sides and overhead. Window casings and frameworks were of steel. The non-glass-covered area of the roof was covered with tar paper, [] The shop floor consisted of a concrete base, covered with hexahedral wooden pieces soaked thoroughly in creosote. The floor was covered by a thin layer of tar.

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10. The electric supply of the shop was a step-down transformer substation, which was located next to the shop on the same side as the accompanying building. The main disconnecting switches were oil switches. There was automatic protection. The wiring system was of a closed-cable type. There was three phase current and a voltage of 380v. The overhead main lighting was from small wattage bulbs under reflecting shades. It was quite insufficient for work in the bays. At the working places, additional bulbs were used.

11. There was hot air heating in the shop. Hot water was supplied by the electric and heating power plant.

12. Water supply was from the plant water supply line. Drainage connections of the shop were connected with the master drainage system and all the waste water was drained off to the river Toretz.

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13. Transportation of materials and equipment to and from the shop was performed by the intraplant railroad on flatcars and gondolas, drawn by switch locomotives or motor railroad cars. Bridge assembling cranes, driven by alternating-current electromotors, were the main intrashop transport facilities of Shop #2.

Each machine bay had two cranes. Bay #6 (assembly bay of the shop) had three cranes, which were located on two floors. On the bottom floor there was one crane with a lifting capacity on the main winch of 40 tons. On the top floor there were two cranes with a lifting capacity of 10 tons each.

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Lifting capacities of cranes of the other shop bays were, [] from 15 up to 30 tons. Battery powered trucks were the shop's second means of transport. The shop owned some of them. They were of $1\frac{1}{2}$ ton and $2\frac{1}{2}$ ton capacity. Loads were also carried on hand carts and by hand. The transfer of heavy machine parts between the bays was carried out either by the cranes of Bay #6 or by railroad flatcars in the front part of the shop. In the first case, the cranes of the machine bays would go out on console parts of crane tracks, and lower loads into Bay #6, which was serviced by its own cranes. In the second case, loads were let down on a railroad flatcar, and the latter was either driven to the necessary bay by a motor railroad car or, very often, was pushed by hand.

14. The basic equipment of the shop included the following metal-working machine-tools:

- Lathes
- Turret lathes
- Horizontal milling machines
- Vertical milling machines
- Keyway milling machines
- Stationary drilling machines
- Radial drilling machine
- Movable drilling machines
- Planing machine
- Shaping machine
- Vertical boring and turning machines
- Boring machines
- Grooving machines
- Broaching machines
- Lathes for boring center holes in cylinders
- Disk saws
- Hack saws
- Surface-grinding machines
- Cylinder-and-cone grinding machines
- Emery grinders
- Vertical gear-cutting machines
- Horizontal gear-cutting machines
- Gear planers.
- Gear slotting machines
- Gear-cutting machines for bevel gears (Bilgram type)
- Gear-grinding machine
- Case-hardening machine for pinions
- Press for fitting on gears
- Relieving lathes
- Some special tool-grinding machines
- Surface-grinding machines for fitting keys
- Some electric welding and gas welding (portable) apparatus
- About three stationary forge hearths
- Inductive furnace for heating up gear and other tires before setting
- The simplest pneumatic instruments (drills, hammers).
- Some portable forge hearths

The number of units of machine tools per bay in Machine Shop #2 is as follows:

Bay #1 - 120 units

Bay #2 - 80 units

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Bay #3 - 30 units
 Bay #4 - 30 units
 Bay #5 - 45 units
 Bay #6 - 10 units
 Sharpening Division and Tool Workroom - 20 units
 Shop Mechanic's Workroom - 10 units
 Total - 345 units

The types of machine tools installed in the shop were determined by the types of products which had to be produced by the shop.

The number of machine tools was determined by the volume of output planned for the shop.

15. The production program of the shop was considered to be an extensive one both in volume and in variety of manufactured objects.
16. Machine tools were quite up-to-date at that time (the middle of the thirties), very often of the most modern design. All of them without exception had one or more individual drives. With the exception of a small number of Soviet manufactured machine tools, all the machine tools were purchased abroad from well-known foreign manufacturing firms. The majority of machine tools were supplied by German firms, but there were English and American machine tools too. I remember the following firms which supplied machine tools to Machine Shop #2:

| | |
|----------------------------|--|
| Asquit | boring machines, movable drilling machines |
| Niles | boring machines, radial drilling machines |
| Schiess-Deffries | gear-cutting machines, vertical boring and turning machines, planing machines. |
| Craven | lathes |
| Farrel | gear-cutting machine |
| Lorenz | a gear planer and some gear-cutting machines |
| Buttler | planing machines |
| vagner | planing machines and milling machines |
| Reinecker | milling machines and gear-cutting machines |
| Pfauter | gear-cutting machines and turret lathes (?) |
| Krasny Proletary | lathes |
| English firm in Manchester | vertical boring and turning machines. |

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17. The most interesting units of equipment were the following:

- (a) The "Farrel-Sykes" gear planer of the Farrel firm was installed in 1938 and used for cutting teeth on gears up to eight m in diameter. ([] the maximum width of gears was 2.2 meters; and the maximum possible cut module was about 50 millimeters).
- (b) The "Lorenz-Sykes" gear-planer of the Lorenz firm was installed in 1934 or 1935. ([] the maximum diameter was about 2.5 meters; the maximum width, one meter; and the maximum module 18 mm.)
- (c) The vertical boring and turning machine of the Schiess-Deffries firm with the face chuck 10 meters in diameter, and multimotor electric drive, was installed in about 1939.
- (d) The gear-cutting machine of the Schiess-Deffries firm was installed in 1938. ([] the maximum diameter of a cut gear was five or six meters.)

These machine tools, which were unique in the USSR, made it possible to perform many jobs, which had been impossible in the USSR before their purchasing.

18. The technological job of machining machine parts was given to the shop, as a rule, by the Technological Development Division of the Shop (BTR) for all the machine parts, which were controlled by the shop. A time quota (norm) was given together with the "plan", since all work on the fulfillment of a program of output in the shop was done by the piece. In reality, "the technology", that is, the technological process prescribed by BTR, would be violated in the Shop everywhere and in a very wide range. A considerable number of violations of the "plan" resulted in incorrect use of machine tools. The latter was a cause of increased wear of machine tools and even breakdowns.

19. The long delay in operation of the Roughing Shop, (Machine Shop #3,) was one of the principal reasons for the burdening of many machine tools with cutting jobs which were too heavy for them. Machine Shop #3 was put into operation in approximately 1937, while Machine Shop #2 began its work in 1934. Machine Shop #3, which was equipped with heavy and tough machine tools, was supposed to be employed on preliminary machining (roughing) of a large bulk of machine parts entering the machine shops. It was done comparatively late and not to a full extent. Many machine tools of Machine Shop #2 were already pretty well worn out by that time.

20. Unskilled machine tool workers and so-called "Stakhanov working methods", directed officially "to squeeze out of machines all they can give", were the main reasons for the extremely high wear of machine tools and the large number of breakdowns.

21. [] plans were made to carry out three grades of machine tool repair work: maintenance work; planned-preventive repair work; and overhauls. The plant had a large and well-equipped Repair-Machine Shop (Machine Shop #4) and a large Chief Mechanic's Division. The latter had a notable number of personnel of the Shop Mechanic's Division in each shop, and in Machine Shop #2 as well. The Shop Mechanic's Division had in its staff: fitters, mechanics, electricians, and electromechanics, both shift and repair. It had at its disposal a shop fitters' machine room and electrotechnical room. In spite of this, quotas of planned-preventive repair works and overhauls in the plant were not fulfilled.

By the time of the evacuation of the plant, that is by the end of the third quarter of 1941, a large number of machine tools were badly worn out and needed repair. The reasons for this were as follows: violations of the "plan"; a large volume of roughing jobs; unskilled machine tool workers; "Stakhanovite working methods"; lack of and poor quality of repair work; and, in particular, lack of spare parts.

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22. The lack of spare parts was due largely to the fact, that the Repair-Machine Shop for a long time (about three years) was engaged in the regular factory production. A considerable part of its equipment and personnel therefore, was not used for ~~25X1X~~ jobs.

25X1X [] the USSR purchased equipment together with spare parts. [] the same was true with the machine tools of NKMZ too. Possibly, it was this circumstance that caused the Director of the plant to order the Repair Machine Shop to work on the regular program of output. However, from a practical viewpoint, this part of its work was performed to the detriment of the plant equipment. It must be taken into consideration also, that there were numerous breakdowns of such machine tool parts, which normally were not regarded as wearing parts. These broken parts would have to be replaced, that is, to be manufactured, in the shortest time possible. The absence of many special tools and materials, which were necessary for the manufacturing of many spare parts, was a very important circumstance. In particular, the Repair Machine Shop would often complain about the lack of a series of pitch mills, the absence of necessary superstrong bronzes, and the fact that it was impossible to do case hardening, and to increase resistance to wear on wearing surfaces by means of other modern processes. Lack of experience among repair 25X1X workers had little effect on the situation. [] NKMZ did not get spare parts from outside, but manufactured them itself in its shops. The exceptions were such special spare parts as ball and roller bearings, and sets of spare parts received from delivering equipment firms.

23. Machine Shop #2 had available all the required types of metal working, measuring, and fitting tools. [] the shop only used cutters with "Pobedit", "Rapid" and "Widia" types of carbide tips. There were a few exceptions: mills of normal types; twist drills; screw taps; broaches; countersink reamers; cutting segments of disk saws; gear cutters; and cutting insertion pieces of all possible types, and the like. Cutting tools were made, [] of high-speed 25X1X steels and carbides.

24. The shop possessed large tool storerooms; a good sharpening division; and a tool work room. They all were united in the so-called Shop Tool Division, which was headed by the Chief of the Tool Division.

The individual nature of the manufacturing in Machine Shop #2 determined the extent of supply of the shop with the different kinds of attachments and special tooling.

- 25X1X [] those attachments which were not integral parts of machine tools and, therefore, were not supplied by machine tool manufacturing.

In practice, the shop used attachments to still less a degree than was planned by technologists. The explanation might be that manufacturing of attachments and special tools very often was delayed. This was due to serious defects in planning and in the general organization of work in the shop and in the plant.

Attachments were often not manufactured until requirements for their use had passed, or their manufacturing would be stopped in view of the fact that their actual delay was becoming evident. It is obvious that this caused deviations in the "plan"; loss of time; and, very often, a change for the worse in the quality of manufactured machine parts.

25. Fitters' tools were chiefly of Soviet manufacture. Their quality, as a rule, was not sufficiently good and Soviet manufactured files and hack-saw blades were especially bad. Besides, there was a continuous shortage of files and hack-saw blades. The shop was well supplied with measuring tools, especially during the first period of its existence, some of which are as follows: some complete sets of limit gauges and limit internal gauges of the second and third grade of accuracy; a large quantity of precise micrometer tools (including those manufactured by "Zeiss"); combined slide gauges; slide gauges; tooth gauges; comparators; thread gauges; feelers; steel folding rules; steel graduated tapes; rulers and tape measures; Johansson gauge blocks; protractors; inside caliper gauges; micrometer gauges; and so on. It is characteristic, that such rough measuring tools as outside calipers and inside calipers were almost absent, and it was one of the most serious reasons for increased wear on precision tools. The unqualified and careless use

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and treatment of all kinds of tools led to their premature wear and mass spoiling. Restoration of tools was slower than their spoiling, and a lack of measuring tools soon resulted. Most of the precise measuring tools, which the shop used during the first years of its existence, were imported from Germany. Machine Shop #2 (and the whole Plant, as well) got cutting and measuring tools from foreign firms (during the first period of the existence of the Plant) from Soviet tool plants, and from the Tool Shop of NKMZ.

26. Each worker of the shop had "tool tags" (five or seven of them, [redacted]), 25X1C and he could get necessary tools in exchange for them from a tool room. Sharpening of cutting tools, including cutters and drills, was performed by the Shop Sharpening Division.
27. Planning of production appears to be one of the weakest and most vulnerable fields of activity of every Soviet enterprise. This may be explained by the existence of a series of required actions, which are determined by the top planners, which, in their turn, are regulated by the Soviet system. These actions in their significant and most essential part, are extremely binding and mis-direct in many respects the activity of any Soviet enterprise. Machine Shop #2 is no exception to this common Soviet situation. Machine Shop #2 used to get production plans, [redacted] each quarter, from "PPO" - the Planning-Production Department of the Plant. The latter worked them out on the basis of the Plant Department of the Plant. The latter worked them out on the basis of the Plant Chief Engineer's directions (theoretically), and submitted them afterwards to the Chief Engineer's for approval. Then, after getting the Chief Engineer's permit, "PPO" passed them down" to the shops. In addition the shop used to get a monthly Program of Output that is a detailed plan of production for every month in question. As a rule, the Program of Output was not given to the Shop beforehand, but on one of the first days of the month for which it had been prepared. This, alone, is an error as it puts the shop in a very difficult situation. A Program of Output used to be developed by the "PPO" of the Plant on the basis of the following starting points: production plans; alterations which came from the top planners; the latest directions from them; and, to some extent the actual status of production was taken into consideration

Directors of the Plants would get, in turn, detailed plans from "MTM" - Ministry of Heavy Machine-Building, yearly plans divided according to each quarter, and quarterly plans divided according to each month. Every deviation from these plans, developed on the basis of directions and plans which had been received by "MTM" from the government, was regarded as a violation of the law and was punished in an appropriate manner. These plans, of course, used to be "passed down" to the Ministry of Heavy Machine - Building and last of all to NKMZ. Besides, in the course of all the period of time which they embraced, they used to be repeatedly subjected to corrections by top planners, and to practical "post factum" alterations, which rose mechanically during the course of work.

Breakdowns in the planned program for Machine Shop #2 were caused by the following:

- (a) Impracticability of the volume of the plan
- (b) Impracticability of the variety of items in the plan
- (c) The tardy delivery of the plan
- (d) Frequent alterations and additions
- (e) Lack of advance scheduling of production plans for foundry and forge shops in comparison with those of the Machine Shop
- (f) Fixing of a complicated and unorganized system of prices, nomenclature, working hours and quality appraisal, setting the plan and preventing its fulfillment.
- (g) Planning the production of the shop for each month and its bureaucratic interpretation

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- (h) The general inefficiency of the system of planning itself, striving for foreseeing, discounting and prescribing for subordinates all to the smallest details. The initiative of subordinates was suppressed and their activity was retarded by petty custody and control. Impracticability, absence of flexibility and a formal, absolute inviolability of plans, also existed. Further explanations of this problem are unnecessary, as a mere examination of the above-mentioned facts, which are the actual original causes of all the principal troubles and defects of the shop, is sufficient to point out the manner in which they influenced the activity of "PRB" (Planning-Distributing Division of the Shop), and all the administrative-technical board of the shop or practically, the operation of the whole shop. It can be affirmed, that plans of production and programs of output, brought about nervousness and disorganization in the operation of the shop. However, the shop management used to obey directions, as it had no other choice, and always used to "pass down" this program to the shop. The Chief of the Shop would deliver the "program of output" to the "PRB" of the shop which would then prepare the necessary documents and deliver them to the shop. These documents were the basis of work in the bays. Besides, the "program of output" used to be read at a meeting of foremen and other leading employees of the shop. (The Chief of the Shop used to call such meetings several times a month).

28. Machine Shop #2 was one of the principal manufacturing shops of NKMZ. The supplying of the shop with necessary production materials, basic and auxiliary, and with fabricated articles bought from other organizations was the duty of the Supply Department of the plant. These materials were delivered to the shop from warehouses of the Supply Department, and were put into the intrashop storeroom. Being a "production" shop, Machine Shop #2 used to get the main bulk of intermediate products and unmachined machine parts from the "preparing shops" of the plant. All kinds of forged pieces, steel, cast iron and non-ferrous castings, steel structures and wood were included in these intermediate products. Machine Shop #2, in its turn, delivered to the other shops: machine parts, machine units and finished products and components of machines, manufactured by these shops (for example: gear reducers, compressors for mine elevators, stopping devices, and so on).
29. Outside coordination, in comparison with that in German plants, was extremely narrow. Practically it was reduced to delivering separate machine parts, machined by Machine Shop #2 and necessary to other enterprises for their production and to the purchasing of fabricated standard articles, which were available in storerooms of the Supply Department of the plant. As a result, a considerable part of the shop equipment was not fully used or was used irregularly (the latter applies to the shop personnel too). For example, the gear cutting bay of the shop was constantly underloaded. The same applies to some individual machine tools of the shop. On the other hand, the shop spent much energy and time on the manufacturing of a large amount of small parts, which in normal conditions would be delivered by small or specialized enterprises. This circumstance reduced very considerably the shop's volume of production, increased its cost, worsened quality, and led to a general underuse of the potentialities of the Shop. The collective use of electrical equipment was one of the few examples of outside cooperation. It was organized comparatively satisfactorily. Assembly and supply of electrical equipment for products manufactured by the shop, [] was taken care of almost 25X1C without exception by a state projecting and assembling organization - "Yuzhelektromontazh". There was an outside coordination division in the plant which was 25X1C called, [] "OZS" (Department of Orders and Sale). [] its service included, to a considerable extent, delivering of products, (chiefly forged pieces and castings) manufactured by NKMZ for other plants of the USSR. Besides electrical equipment, Machine Shop #2 used to receive from outside such products as fittings, fastening machine parts, rolled steel, rolled non-ferrous metal, bronze intermediate products; brass, lead, babbitt; paint materials, wood, leather, ball and roller bearings, and other standard materials and products. However, the shop used to manufacture for itself even such special products, as oil pumps, compressors, air distributors and regulators of pressure for mine elevators. This latter was not done in Germany, as it was extremely impractical. There was an enormous need for outside cooperation (for the plant and from the plant), but this was badly organized in NKMZ, and in the USSR in general. The explanation is that there are some basic tenets, inherent in the Soviet system, and the system cannot be improved in the USSR.

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30. The actual staff of Machine Shop #2 included the following categories of workers and employees:

| Num- bers | Category | Total number of Person | Notes |
|--------------|---|---------------------------------|---|
| I | Machine tool workers | 800 | Workers of all qualifications, who worked on machine tools, and were engaged in works included in the "production" of the shop. |
| 2 | Assembly-fitters | 250 | Fitters engaged in the assembling (and finishing) of production of the shop. |
| 3 | Foremen and assistant foremen | 50 | Among them-senior foremen and chiefs of the bays. |
| 4 | Instructors | 20 | Highly-skilled workers, sometimes graduate engineers or technicians. |
| 5 | Markers | 20 | Marking out machine parts for further machining. |
| 6 | Welders | 10 | Electrical welders and gas welders. |
| 7 | Shop Tool Division personnel | 60 | Distribution, storeroom, sharpening division, tool work room. |
| 8 | Shop Mechanic's Division | 80 | Fitters; machine work room and shift fitters; electrical technical work room and shift electricians; crane operators. |
| 9 | OTK of the Shop | 15 | The Shop Technical Control Division. |
| 10 | PRB of the Shop | 40 | The Shop Planning-Distributing Division |
| 11 | BTR of the Shop | 40 | The Shop Division of Technological Development. |
| 12 | The Shop Bookkeeping Division | 15 | Bookkeeping, calculation, estimating, timekeeping, cashier. |
| 13 | Chargers | 20 | Workers (often-technicians), supplying machine tools and crews with machine parts and materials necessary for work. |
| 14 | Binding men | 30 | Workers servicing transfer of loads by cranes. |
| 15 | Unskilled workmen | 100 | Unskilled workmen and adult apprentices. |
| 16 | Auxiliary categories of workers and employees | 40 | Painters, carpenters, storeroom men etc. |
| 17 | Personnel staff of the Chief of the Shop | 10 | Chief of the shop, chief of the shop assistants, secretaries, typists. |
| Altogether | | 1600 | personnel. |

(Note: The above list provides only approximate figures.)

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31. The primary manning of Machine Shop #2 with skilled workers and with engineers and technicians was done by means of the following measures: Shifting people from the Old Kramatorsky Machine-Building Plant; sending people from industrial centres of the USSR (Leningrad, Moscow, Sormovo) from enterprises and planning organizations; sending people who had just completed secondary technical schools, universities and trade schools. Then graduates of the Plant Trade School began to appear. At first many people were employed for adult apprenticeship, they were chiefly from the local population. (Some of them were so-called "contractors"). After some time they formed a considerable percentage of workers with low qualifications. In addition some workers and employees of all qualifications would come voluntarily from other places, as it was still possible at that time (in the 1930's). There was a noticeable separation of local workers and newcomers among the employees. Local people lived chiefly in Kramatorsk, Slavyansk and in the Belenkaya, Krasnaya Gorka, and other settlements, located near the railroad line, at a distance of approximately 30 kilometers from NKMZ, in Konstantinovka, for example. The majority of them had private dwellings. Many had been living in the region for a long time. All of them, almost without exception, had kitchen gardens, which were very important for their nutrition. Many were emigrants from villages and had connections with it somehow or other. They traveled by special workers' trains to the plant and back and lived somewhat better than the newcomers. Many of them were Ukrainians. At the end of the thirties there were somewhat more than a half of such local people among the workers, and less than a half among supervisors. The newcomers lived chiefly in Sotsgorod, in the old town of Kramatorsk in plant houses, and in settlements of private houses which were being built in the Kramatorsk region. The 16th Section of Sotsgorod was populated almost exclusively by plant supervisors. The 15th, the 17th, and the 18th Sections were populated almost exclusively by plant workers. The qualifications of the majority of workers and employees of all categories were very low during the first years, however, by the time of the evacuation of the Plant at the end of 1941 the Shop was composed of satisfactory personnel. The rising of the general level of qualification was due to a considerable extent to acquiring experience during work. However, the following played an important part too: Graduates of the Plant Trade School; a permanent influx of young specialists from universities and secondary technical schools from other cities; different kinds of courses for all the categories of plant workers and employees, including "courses of technical minimum" for workers and "foremen courses". It is important to indicate that the Kramatorsky Evening Machine-building Institute in Kramatorsky was operated up to 1936 or 1937. Many of the Plant employees studied there, and, in particular, some of the technologists and planners of Machine Shop #2. The total number of graduate engineers working in the Shop was about 30, and there were about 20 graduate technicians.

32. The organizational structure of Machine Shop #2 was typical of most of the shops of NKMZ. The approximate chart of this structure, Enclosure (A) was neither constant nor absolute. On the contrary, it repeatedly underwent alterations

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[] Moreover, many senior employees of the shop, [] came to the conclusion that neither of those charts was practically satisfactory. The necessity of fulfillment of the state plan of production on the Soviet basis was the foundation of the administrative structure of the Shop. Because of this there came about an exaggeration of the part which the planners of the "PRB" and, partly, "BTR" shops had to carry out. Rights and functions, which were much more extensive than they should have been, were misappropriated by the "PRB". Employees of "PRB" constantly assumed administrative functions. This circumstance lessened the authority, and removed, to a considerable extent, the responsibility from production employees, from senior foremen and their staff, in particular. In the bays, orders often came from too many people, and these people were, moreover, not linked by a direct mutual subordination. Owing to this, orders often were contradictory and provoked discords and controversies. In the course of working, the correct procedure, even if it did occur now and then, was lost as a rule. The organizational structure itself, and methods of its practical realization,

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introduced series of blank spots into the work of the staff of the shop. In particular, the fear of a "funktsionalka" (the organizational structure by which a quite definite and strict distribution of functions between employees takes place) compelled the administration to force employees of the shop to the mutual overlapping of functions and caused a destructive parallelism. As the Administration of the shop saw the poor results of the work of the shop and understood that they stemmed, to a considerable extent, from a degree of imperfection in the organization of work in the shop itself, the Administration would often strive to make corrections. As a rule, however, no serious improvements were seen due to the fact that they only reflected insignificant shades of view of the shop management, and could not touch on the faulty foundations of the organization which was basic to the Soviet system.

33. In the Soviet system work brings: a plan from above (as a rule, an impracticable one); forced fulfillment of the plan as a basic method; extreme material poverty of the personnel of the shop; a common absence of interest in a real finished product; a low discipline and a "poor ability to be conducted" of all the personnel of the shop; the interference of the Communist Party organization, and some times of the trade union organization into the administrative functions, and their constant influence upon the personnel (influence which is misdirected in most cases). The absolute dependence of Machine Shop #2 upon the preparing shops, which worked unsatisfactorily, was the special feature of the Shop. The Machine Shop mechanically reflected the whole sum of faults of the preparing shops in the form of defects of production and the non-fulfillment of the program of output.

The points mentioned below should be considered the "special features" of the work of the shop: The above-mentioned unsatisfactory state of the organizational structure of the shop carried over to the general management of work in the shop; frequent alterations of the organizational structure of the Shop; a very frequent replacing of the management of the shop (for example, four chiefs and most of their assistants were replaced during the period from January of 1935 to July of 1936); a chronic non-fulfillment of production quotas, (Machine Shop #2 was considered to be one of the most "difficult" shops of the NKMZ); low efficiency; the very low level of the development of outside coordination creating a situation which led to the irrational utilization of equipment and general facilities of the shop; lack of opportunity for the specialization of people and equipment within the limits allowed by the type of the manufacture; low quality of production; the presence of first-class equipment and a very good building; three-shift work on machine tools; two-shift work on assemblage; a sufficient number of personnel; a work week of 48 hours (daily) for workers and supervisors officially. However, many categories of engineers, technicians and supervisors (the latter chiefly of senior categories) worked actually many more hours a week, and, moreover, without any supplementary payment; the presence of sufficiently qualified specialists and workers. (However, the general level of qualification of personnel was low. By the end of the 1930's the situation with regard to the qualifications of personnel improved very much.); a very low general level of operating efficiency; the staff of "OTK" (Technical Control Division) (Inspection Division) of the shop was insufficient both in quality and in quantity; insufficient lifting capacity of cranes in Bay #6; and a common lack of load-lifting facilities and machine tools in the assembly section.

34. As it is shown on the "Approximate Chart of the Organizational Structure of Machine Shop #2" [Enclosure (A)] the shop mechanic and the chief of "OTK" of the shop, together with their divisions, are not subordinated to the chief of the shop. They are subordinated in their work to the Chief Mechanic of the Plant and to the chief of the "OTK" of the plant respectively. The "OTK" is excluded from the authority of the chief of the shop for the convenience of the Control of the Direction which supervises the work of the shop, as the management cannot trust the chief of the shop under the Soviet system. The foreman of the Expediting Department, together with his group of supervisors and workers, was occupied with: reception of articles from the shop which had been prepared officially to be ready for freight handling; packing of articles; preparing transport documents; loading articles into railroad cars; and delivering them to the railroad.

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This group is not included in the staff of the shop because of the following reasons: its personnel working in the shop was changeable; it was subordinated, [] to "OZS" (Department of Orders and Sale) of the plant and was serviced by the Transport Shop of the plant; and it controlled the work of the shop as well.

In the second half of the thirties a centralized dispatcher service headed by the chief dispatcher of the plant was organized in NKMZ. There was a Central Dispatcher Department, which was located in the Plant General Office Building not far from the plant director's office. All the shops of NKMZ, including Machine Shop #2, had dispatcher posts with their own special system of telephone and system of accounting. The "Approximate Chart of Organizational Structure of Shop #2" does not reflect the situation completely. One of the characteristics of the normal operations in the shop was the presence of a large quantity of scrap (made by the shop itself and by the preparing shops), "defects", and other unproductive work. The average "commodity" productive capacity of a worker in the shop (that is the capacity referred to as the actual output of "commodity" production) was very low. Accordingly, the output of "commodity" production by the shop was very low too. Ignorance on the part of the administration was common. In many respects it was impossible for the administration to study the operation, and consciously move it in the scheduled direction (course) by means of the most reasonable methods. In spite of the visible efforts of the administration of the shop (and of the plant), the operation would constantly get out of hand and would run as if completely arbitrarily. Anarchy was prevalent in the shop, a direct result of the general state of the operation and the poor organization of work. The tendency of the administration to fulfill as many special orders (discounting the work of the shop) as possible was one of the reasons for disorder.

34. The machine bays always had a choice of machine parts for machining, and used to try to take the most "beneficial" machine parts for that purpose, that is, machine parts which were the simplest for machining and lasted the greatest number of machine tool hours. At the same time, being afraid not to fulfill a plan according to its machine tool hours, they would place the most convenient machine parts on machine tools. As a result, the bays and storerooms were heaped up with machine parts, often only needed in the far future, causing the work of the assembly section of the shop to be greatly delayed. As a rule, the assembly section had nothing to do with a program of output of a current month in the beginning of the month and, sometimes, up to the middle of it. The assembly section used to get a full "loading" only from the twentieth of the month on. In addition, machine parts, as a rule, had defects, that is, they required more time for assembling than had been specified by the "plan". Additional time for assembling used to be up to 20 - 30% of the original time specified by the "plan", and sometimes this percentage was even higher. It is obvious that in those conditions, a program of monthly production could not be fulfilled on time with the input of a normal amount of working hours.

That is why much overtime was spent in the assembly section during the second half of a month. Considering that overtime hours were paid in one and one half time more than normal working time (and the later hours, still higher, up to double), they were uneconomical for the government.

Formally, overtime hours were limited for the Shop. However, actually, the director of the plant used to get permission for payment of a large quantity of overtime hours supplementarily, since it was impossible to do without them, in such circumstances. As a rule, much work on assembling and completing articles manufactured by the shop used to be finished only at the beginning of the next month. However, the "OTK" (Technical Control Division) of the shop and of the plant would pass inspection on products officially, as if performed in a current month. It would be done not only at the request of the shop, but at urgent requests of the director of the plant too, since both the shop and the director were interested in "delivery" of goods, that is, in a formal fulfillment of the plan. Of course, this practice was prohibited by law, and in politically important cases, it would be severely punished. However, it

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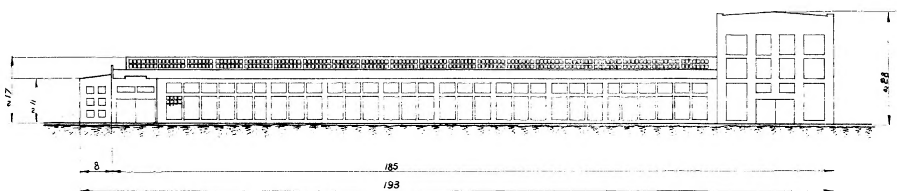
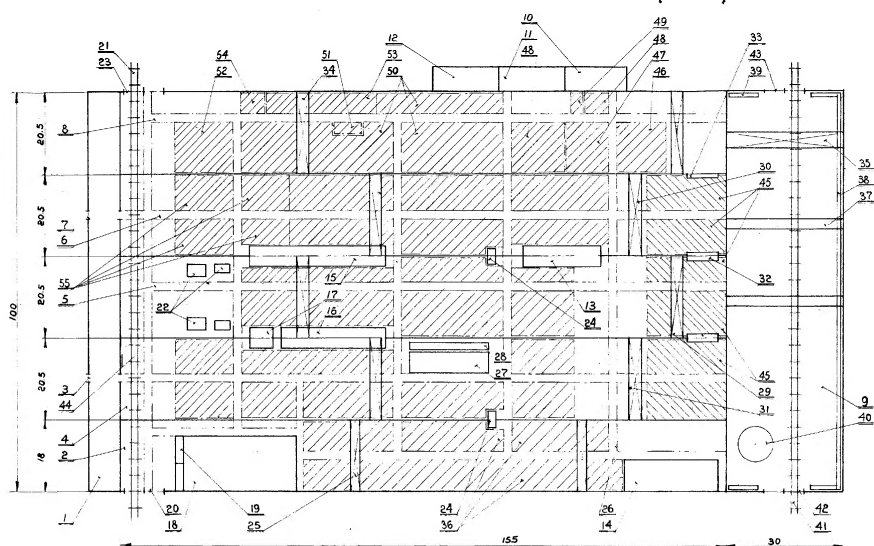
was practiced everywhere, and the Ministry knew about it. Nevertheless, nothing very essential for the improvement of the situation at the plant could be done.

35. The weakest points in the activity of Machine Shop #2 were as follows:

- (a) Planning of production and control of work performance.
- (b) General organization of work in the shop.
- (c) Operating efficiency.
- (d) Quality of production.
- (e) Intraplant and outside coordination.
- (f) Wear of machine tools and tools (fixtures and cutting tools).
- (g) Morale of workers and employees.

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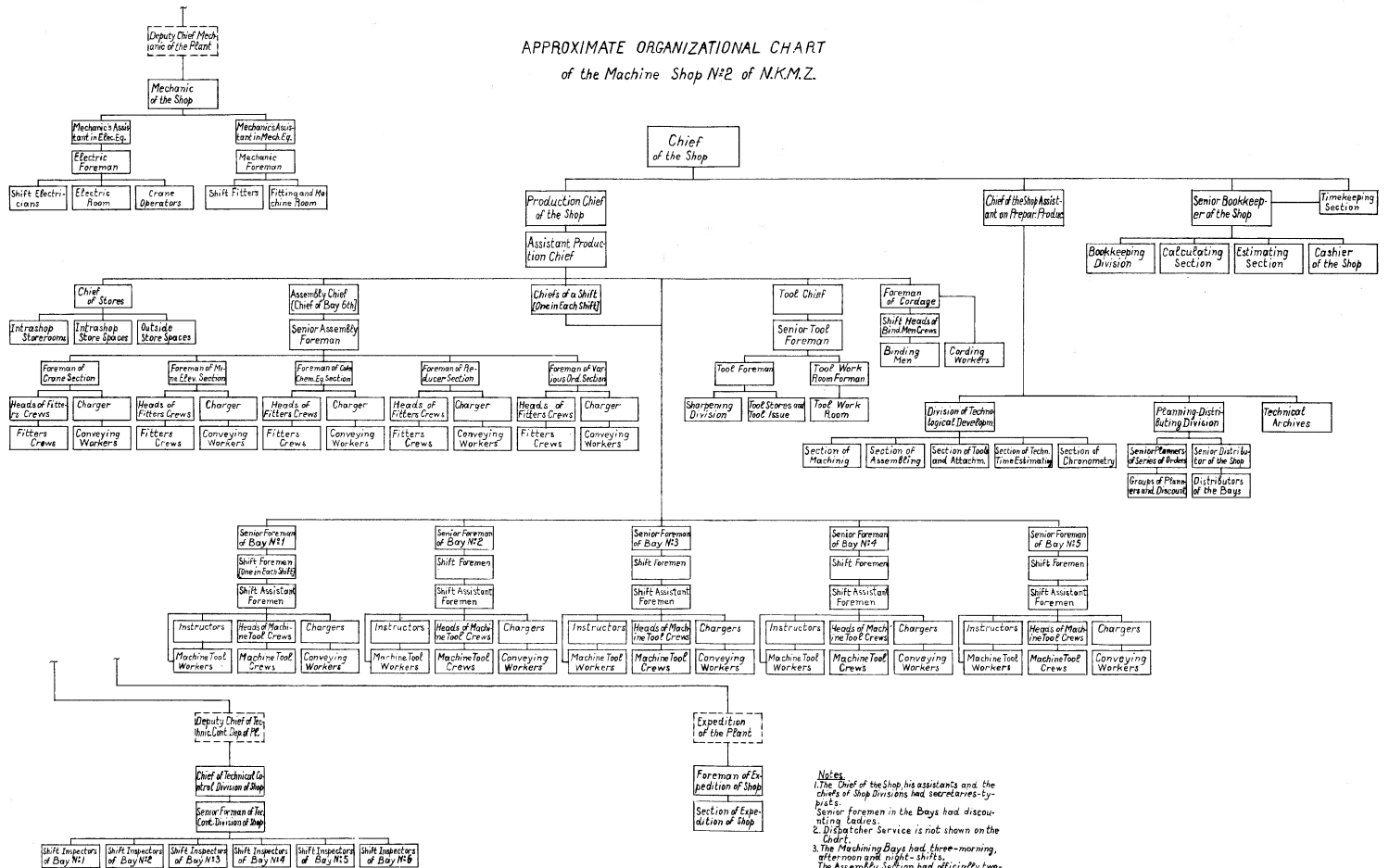
ENCLOSURE (A): Approximate Organizational Chart of Machine Shop No #2 of NKMZ
(B): Approximate Plan of Machine Shop #2 with Legend.



Notes
1. Dimensions are in meters.
2. Dimensions are approximate.
3. Explanations to the specification are given in the Explanatory Report on the Machine Shop No. 2.

| Num bers | Name | Notes |
|-------------|---|-----------------|
| 55 | Boring and Turning Machines | |
| 54 | Casehardening of Pinions | |
| 53 | Gearcutting Machines of Bilgram | |
| 52 | Gear-cutting Machines of Lorenz | |
| 51 | Press | |
| 50 | Gear-cutting Machines | |
| 49 | Gear-cutting Machine of Lorenz Sykes | |
| 48 | Gear-cutting Machines of Schiess Deffries | |
| 47 | Gear-cutting Machine of Schiess Deffries | |
| 46 | Gear-cutting Machine of Farrel Sykes | |
| 45 | Additional Assembly Area | |
| 44 | Time-keeping Board | |
| 43 | Shop Gateway | |
| 42 | Shop Gateway | |
| 41 | Railroad Line | |
| 40 | Boring and Turning Machine | |
| 39 | Fitters' Benches | |
| 38 | Fitters' Benches | |
| 37 | Bridge Crane of top floor | Q=10 tons |
| 36 | Area of Machine Tools | |
| 35 | Bridge Crane of bottom floor | Q=40 tons |
| 34 | Bridge Crane | Q=20 tons |
| 33 | Fitters' Benches | |
| 32 | Double-row Fitters' Benches | |
| 31 | Bridge Crane | Q=25 or 30 tons |
| 30 | Bridge Crane | Q=25 or 30 tons |
| 29 | Bridge Crane | Q=25 or 30 tons |
| 28 | Movable Boring Machines | |
| 27 | Blocks for fastening m.p.s. | |
| 26 | Cross Passage | |
| 25 | Bridge Crane | Q=10 or 15 tons |
| 24 | Control Blocks | |
| 23 | Shop Gateway | |
| 22 | Layout Blocks | |
| 21 | Railroad Line | |
| 20 | Shop Gateway | |
| 19 | Shop Compressor Room | |
| 18 | Intrashop Storeroom | |
| 17 | Production Chief's Office | |
| 16 | Sharpening Division | |
| 15 | Office in the Bay | |
| 14 | Mechanic's Compartment | |
| 13 | Office and Storeroom | |
| 12 | Shop Tool Room | |
| 11 | Shop Forge Room | |
| 10 | Shop Lavatories | |
| 9 | Bay No. 6 | |
| 8 | Bay No. 5 | |
| 7 | Entrance into the Shop | |
| 6 | Bay No. 4 | |
| 5 | Bay No. 3 | |
| 4 | Bay No. 2 | |
| 3 | Shop Passageway | |
| 2 | Bay No. 1 | |
| 1 | Attending Building | |

APPROXIMATE ORGANIZATIONAL CHART of the Machine Shop N°2 of N.K.M.Z.



Notes:
1. The Chief of the Shop has assistants and the Chiefs of Shop Divisions had secretaries-by-bays.
2. Senior foremen in the Bays had dismounting ladders.
3. The Machine Bays had three-morning, afternoon and night-shifts.
The Assembly Section had officially two-morning and afternoon-shifts.